

LISTING OF CLAIMS

Claims 1-13 are pending. Please amend claims 1, 6, 7, 9, 10 and 12 as shown. Please cancel claims 11 and 13 without prejudice or disclaimer. The following listing of claims will replace all prior versions and listings of claims in this application.

1. (Currently Amended) An illumination optical system for illuminating a mask that arranges a ~~predetermined~~ contact-hole pattern and an auxiliary pattern smaller than the ~~predetermined~~ contact-hole pattern using light from a light source, said illumination optical system comprising:

an illumination-light generating mechanism for dividing the light and for forming a quadrupole light intensity distribution around an optical axis on a surface that has substantially a Fourier conversion relationship with the mask, so as to resolve the ~~predetermined~~ contact-hole pattern and restrain the auxiliary pattern from resolving,

wherein at least one of a size of each pole ~~of~~ in the quadrupole light intensity distribution and a distance between the optical axis and each pole ~~of~~ in the quadrupole light intensity distribution are variable, and

wherein the contact-hole pattern aligns with the auxiliary pattern on the mask in longitudinal and transverse directions, and each pole in the quadrupole light intensity distribution separates from the optical axis in the longitudinal and transverse directions.

2. (Original) An illumination optical system according to claim 1, wherein said illumination-light generating mechanism includes a prism.

3. (Original) An illumination optical system according to claim 2, wherein the prism includes pyramid surfaces that arrange a concave surface at an incident surface side and a convex surface at an exit surface side.

4. (Original) An illumination optical system according to claim 1, wherein the illumination-light generating mechanism includes a diffraction optical element.

5. (Original) An illumination optical system according to claim 1, wherein the illumination-light generating mechanism includes:

plural optical elements; and
a switch mechanism for arranging each optical element on and retreating each optical element from a light path.

6. (Currently Amended) An illumination optical system according to claim 1, further comprising an illumination-light deforming mechanism for varying at least one of a size of each pole of in the quadrupole light intensity distribution and a distance between the optical axis and each pole of in the quadrupole light intensity distribution, wherein the illumination-light deforming mechanism includes plural lenses that have a variable magnification or focal distance.

7. (Currently Amended) An illumination optical system according to claim 1, further comprising an illumination-light deforming mechanism for varying at least one of a size of each pole of in the quadrupole light intensity distribution and a distance between the optical axis and each pole of in the quadrupole light intensity distribution, wherein the illumination-light deforming mechanism includes:
first and second optical members; and
a drive mechanism for relatively moving the first and second optical members in an optical-axis direction.

8. (Original) An illumination optical system according to claim 7, wherein each of the first and second optical members is a prism.

9. (Currently Amended) An illumination optical system according to claim 1, wherein each pole of in the quadrupole light intensity distribution has a variable shape.

10. (Currently Amended) An exposure apparatus comprising:
an illumination optical system for illuminating a mask using light from a light source, said mask arranging a ~~predetermined~~ contact-hole pattern and an auxiliary pattern smaller than the ~~predetermined~~ contact-hole pattern; and

a projection optical system for projecting light from said illumination optical system onto an object to be exposed,

wherein said illumination optical system includes an illumination-light generating mechanism for dividing the light and for forming a quadrupole light intensity distribution around an optical axis on a predetermined surface that has substantially a Fourier conversion relationship with the mask, so as to resolve the ~~predetermined~~ contact-hole pattern and restrain the auxiliary pattern from resolving, wherein at least one of a size of each pole ~~of~~ in the quadrupole light intensity distribution and a distance between the optical axis and each pole ~~of~~ in the quadrupole light intensity distribution are variable, and

wherein the contact-hole pattern aligns with the auxiliary pattern on the mask in longitudinal and transverse directions, and each pole in the quadrupole light intensity distribution separates from the optical axis in the longitudinal and transverse directions.

11. (Canceled)

12. (Currently Amended) A device fabricating method comprising the steps of:

exposing an object using an exposure apparatus; and
performing a predetermined process for the object that has been exposed,

wherein the exposure apparatus includes:

an illumination optical system for illuminating a mask using light from a light source, said mask arranging a ~~predetermined~~ contact-hole pattern and an auxiliary pattern smaller than the ~~predetermined~~ contact-hole pattern; and

a projection optical system for projecting light from said illumination optical system onto an object to be exposed,

wherein said illumination optical system includes an illumination-light generating mechanism for dividing the light and for forming a quadrupole light intensity distribution around an optical axis on a predetermined surface that has substantially a Fourier conversion relationship with the mask, so as to resolve the ~~predetermined~~ contact-hole pattern and restrain the auxiliary pattern from resolving, wherein at least one of a size of each pole ~~of~~ in the quadrupole light intensity distribution and a distance between the optical axis and each pole ~~of~~ in the quadrupole light intensity distribution are variable, and

wherein the contact-hole pattern aligns with the auxiliary pattern on the mask in longitudinal and transverse directions, and each pole in the quadrupole light intensity distribution separates from the optical axis in the longitudinal and transverse directions.

13. (Canceled)